

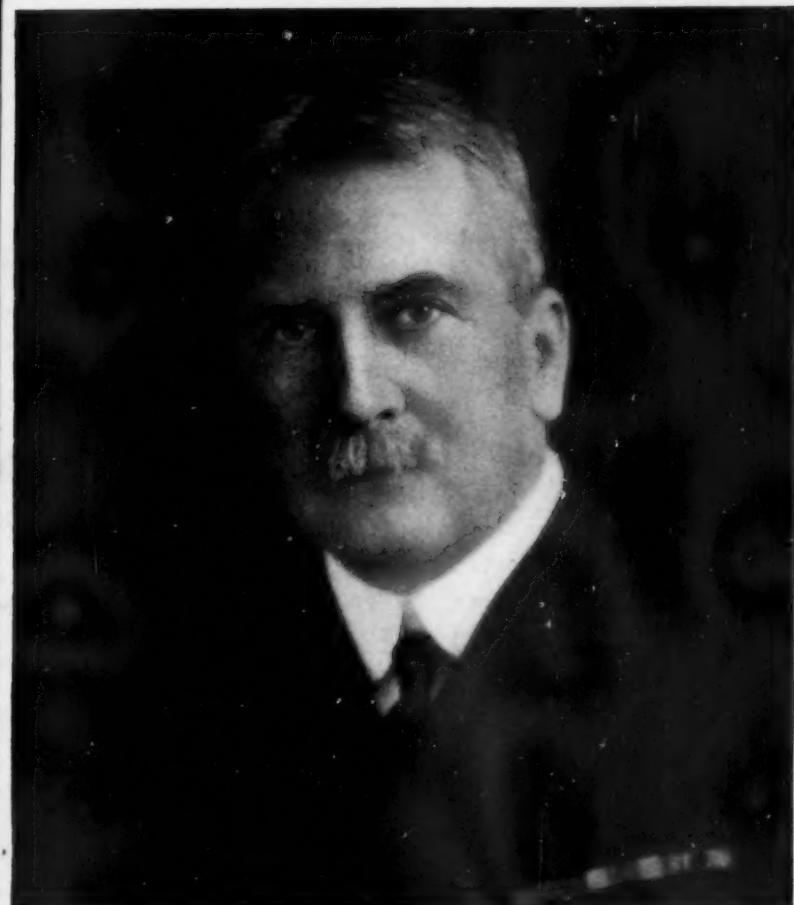
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# SCIENCE NEWSLETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE.



NOVEMBER 1, 1930

Admiral Taylor, Chosen For Engineers' Highest Award

See Page 281

A

SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

Vol. XVIII

No. 499

The Weekly  
Summary ofCurrent  
Science

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SCIENCE SERVICE

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## DO YOU KNOW THAT

Life-size rubber models of the human body are being used for instruction purposes in medical schools.

One-room schools, the "little red schoolhouses" of an earlier generation, dropped out of existence at the rate of 4,600 a year between 1920 and 1926.

Flies and mosquitoes cannot stand pine oil.

The United States imports furs from about 80 countries of the world.

A silkworm produces several thousand yards of silk filaments in the course of its working career.

Cotton roads are being tried out in Texas and South Carolina, using a process by which the cotton cloth is treated with asphaltic oil, laid over the surface of the graded dirt roadway and surfaced with sand or gravel.

Big Hawaiian raspberries are being introduced into California.

Yellowstone National Park is the last stand of the Trumpeter Swan, the largest of all American waterfowl.

Traveling stores, that sell clothing, groceries, and other goods, are thriving in some sections of the country.

Exhaust gases from automobiles contain from four to ten per cent. of carbon monoxide gas, which is dangerous when inhaled in a closed space.

A bone needle 25,000 years old, used by some cave man or woman in making reindeer skin clothes, is an interesting relic of prehistoric culture in France.

Ginkgo trees from the orient, which are widely planted in the United States, apparently have no insect enemies or fungus diseases in this country.

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Science Service presents on the radio, an address

## WHAT GERMS ARE MADE OF

By Dr. William Charles White, of the U. S. Public Health Service, and chairman of the Medical Research Committee of the National Tuberculosis Association, which has undertaken a chemical and biological study of the tubercle bacillus

Friday, November 7, 1930, at 3:45 p. m., Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

ASTRONOMY

# Success of Eclipse Expedition Is Reported by Leader

**"Photographs of Marvelous Beauty" Developed on Tropic Island "With Little Water of Any Kind"**

By Radio From

**DR. S. A. MITCHELL, Scientific Head U. S. Naval Observatory Eclipse Expedition to South Pacific, and Director of McCormick Observatory, University of Virginia.**

**N**IUAFOU Island, South Pacific.—Photographs of marvelous beauty, showing the sun's corona during the eclipse of last week (total eclipse of sun on October 21-22) with great detail, have rewarded the weeks of preparation and effort in connection with the American expedition's eclipse observations here on Tin Can Island. (SCIENCE NEWS LETTER, Oct. 4 and 25, 1930).

We have just developed many of the photographs taken during the short period of totality and they confirm our feeling that this expedition's success has been unequalled in astronomical annals.

The development of photographs on this tropical island with no running water, and even with little water of any kind has been a difficult task.

Prof. R. W. Marriott, of Sproul Observatory, who had charge of corona cameras has now developed most of the coronal photographs and the sixty-three foot tower and the sixty-five foot horizontal telescope took pictures of great beauty. The smaller cameras also gave splendid negatives.

The photographs show that the corona exhibited streamers to the east and west and that it was midway in shape between the coronas characteristic of maximum and minimum sunspot periods. An interesting coronal dome shaped like a gigantic strawberry is a prominent feature of all the photographs.

## Eclipse Arrived Early

I spent a whole night from dark to daylight in developing the spectrogram taken with two powerful concave gratings. The photographs show exquisite definition from thirty-two hundred angstrom units in the violet region of the spectrum to seventy-eight hundred in the red portion. More than thirty lines of the hydrogen series exhibit

themselves and these spectra contain eight coronal lines. The green coronium line shows exquisite structure and details a coronal disturbance agreeing in position but differing in shape from a prominence.

Our observations of time carefully computed show that the moon arrived early, the eclipse beginning two seconds earlier than calculated in advance and ending half a second early. Such slight deviations from prediction, however, are to be expected.

The spectra photographs taken by the New Zealand party showed good definition from the blue to the red region and the dispersion of the spectra taken with their prismatic camera is about one-tenth that secured by instruments.

## "Luck Was With Us"

Luck was with us. It rained during the night and again only two hours before totality, but it cleared in time and the total eclipse of the sun that we have travelled thousands of miles to observe was seen through clear skies with a very slight haze. The entire program was carried through successfully, though of course the photographs will provide material for study for many months after we return to the States.

The sun's corona, which flashed out around the dark disc of the moon during totality, was of the medium type that is to be expected at such a time as this, when we are about half way between a time of maximum sunspots and one of minimum. Two pronounced streamers of the corona projected out from the glow which completely surrounded the sun. We also saw half a dozen prominences, red flames of hydrogen, but none of these was very large.

At both the beginning and end of the total eclipse, the Bailey's beads appeared, resulting from the last sliver of sunlight shining out through valleys along the edge of the moon. The shadow bands appeared also on the earth's surface before the beginning and after the end of totality. These dark ripples were about an inch wide and



**DR. S. A. MITCHELL**

*He has traveled 60,000 miles to see fifteen minutes of eclipse.*

about eight inches apart. They travelled over the earth at a speed of twelve miles an hour in a north northwest direction. No bands were seen during totality.

We were also interested in watching the natives of this little island as the magnificent spectacle of a total eclipse appeared in the heavens. They were interested in it, but were quiet and did not seem to be frightened.

This is the eighth eclipse expedition that I have participated in, and the seventh eclipse that I have seen, for in Norway, in 1927, on my seventh expedition, my luck failed, and clouds prevented any observations. Before this trip I travelled about sixty thousand miles for eclipse observations, but had only seen the sun eclipsed for a paltry fifteen minutes all together. Now I have seen it eclipsed for about a minute and a half longer.

Mrs. Mitchell and I came here by way of San Francisco, but we shall keep on going around the world, returning by way of Europe and New York early in January. Other members of our party, however, will return by the more direct route. Dr. Adams and members of the New Zealand party, who also had complete success, will also return home as soon as they can dismantle their apparatus.

## By Science Service Staff Writer

A total of 41 photographs were taken of the corona, in addition to the plates

made in the Einstein camera and the spectrograms. Commander C. H. J. Keppler, U. S. N., administrative head of the party reported in a radio message to the U. S. Naval Observatory in Washington. The Einstein plates are expected to shed further light on the problem of whether light from a distant star is bent as it passes the sun. This effect was predicted by Einstein's theory

of relativity, and was verified on previous eclipse expeditions, but more measures of it will be desirable. Many months of work on the plates, comparing them with plates of stars in the same region made when the sun is in another part of the sky, will be required before any results can be announced, however.

*Science News Letter, November 1, 1930*

ENGINEERING

## Power for Claude Process Like Infinite 300-Ft. Waterfall

### Famous French Scientist Tells Americans of Success Of Matanzas Tests and Announces Large New Plant

**P**OWER equivalent to that of a cataract pouring an unlimited volume of water endlessly over a 300-foot fall is stored in tropic seas. This power is not locked tightly in minute molecules and electrons, like atomic energy; it is now ready to be released by the engineer, as some has already been, to lighten the labor of man.

Prof. Georges Claude, famous French scientist, thus expressed faith in his process for utilizing the temperature difference between the surface and deep waters of tropic oceans during a lecture before the American Society of Mechanical Engineers in New York last week.

Professor Claude came to America from Matanzas, Cuba, where after overcoming many difficulties, he conducted experiments with his process which proved highly successful. (SCIENCE NEWS-Letter, October 4, 1930).

The tests, covering a period of three years, have resulted in the collection of information that will make possible the construction in the near future of a plant of 25,000 kilowatts capacity which Professor Claude said, will probably be located near Santiago de Cuba. A plant of this size is large enough to supply the normal power requirements of thousands of people.

#### The New \$3,000,000 Plant

The new plant will cost approximately \$3,000,000. In terms of output this is a greater cost than that of modern steam plants, but it compares favorably with the cost of hydro-electric installations. The French scientist stated, however, that his recent tests show him that a much larger plant, yet no larger than

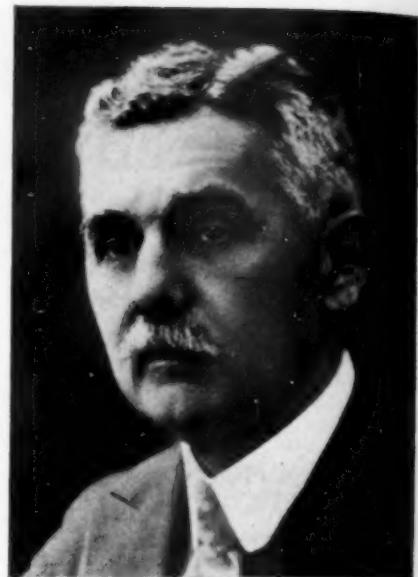
many now in operation, can be built for an installation cost of \$60 per kilowatt, which is an unusually low figure.

How the warm oceans contain the power of endlessly falling water was clearly explained by Professor Claude. He said:

"By no means is it in question to extract power from waves, from tide, from streams. What we had in mind, my friend Boucherot and myself, was to utilize the prodigious fact which in tropical seas by the paradoxical collaboration of sun and the poles, maintains an important and almost invariable difference of temperatures between the surface sea water continually heated by the sun from 75 to 85 degrees Fahrenheit and the deep sea water, which a very low circulation from the poles to the equator maintains close to the freezing point of water, that is, 40 to 43 degrees Fahrenheit at a depth of 3,000 feet."

The scientist declared that regardless of what process was used, a well-known principle of thermodynamics affirms the fact that from such a difference in temperature it is possible to get power. He then explained his method in which the ocean water, itself, acts as the medium for converting the temperature difference into power.

In the Claude process warm surface water is changed into steam by boiling at a very low pressure. The tepid water is not heated; it is merely subjected to a vacuum and when the pressure gets sufficiently low the water turns into steam. The steam passes through a turbine, which it turns to produce power, and then goes to the condenser. Here



PROF. GEORGES CLAUDE

*Defended his process for getting power from tropic seas against the criticisms of "those who will never understand that there are cases where it may be interesting to spend 80 kilowatts to receive 25."*

the cold water from deep in the ocean condenses the steam, thus maintaining the vacuum which causes the warm water on the other side of the turbine to continue to evaporate.

The plant at Matanzas, the scientist made clear, was never intended to be a commercial success. It was known from the beginning that more power would be required to pump water from the ocean and for other auxiliary purposes than would be produced. This was the first test of the process with actual ocean water. Professor Claude wanted actually to overcome the difficulty of sinking a pipe line to the ocean bottom and he wanted to see if the sea water would boil without excessive foaming which would be injurious to his turbine.

No turbine of the type needed has been built and he had to use a standard commercial make which is designed for steam under high pressure. This was a small unit, and he had to pump ten times as much water as it needed. If less water had been taken from the bottom of the ocean, it would have gotten too warm before reaching the surface.

"For these and some other similar facts," Professor Claude summarized, "my plant was condemned from before its birth to spend much more energy than it would ever produce and to provoke accordingly the jokes of those who will never understand that there are

cases where it may be interesting to spend 80 kilowatts to receive 25."

Although he was unsuccessful in the first two attempts to launch his mile-long tube, and was continually criticized by the skeptical, Professor Claude never became discouraged. As in this case, he declared, his chief troubles with previous inventions have come not from faults of the process or theory, which is the fight against matter, but from the fight against man.

"So numerous, so efficient today are the resources put at our disposal by nature and by science," he said, "that in my opinion material difficulties can always be mastered with some imagination and perseverance. But man—this is another business; to have the last word with him logic and good sense are not sufficient."

Science News Letter, November 1, 1930

GENETICS

## Two Sets of Identical Triplets Have Been Found in Canada

Developed From a Single Cell, They Are Much Alike in Appearance and in Mental and Emotional Make-up

**T**WO CASES of that extremely rare biological phenomenon, human identical triplets, have been reported to the American Genetic Association in Washington, by Alfred E. Clarke, and Daniel G. Revell, biologists of the University of Alberta, Canada.

Triplets of the type known as identical, or monozygotic, are, like identical twins, developed from a single egg cell. They are always of the same sex, and since they have the same hereditary endowment, they are very much alike in appearance and also in mental and emotional make-up.

When twins develop from separate egg cells or zygotes, they are no more alike than ordinary brothers and sisters except that they are of the same age. Indeed, they may be decided contrasts in temperament as well as physical appearance.

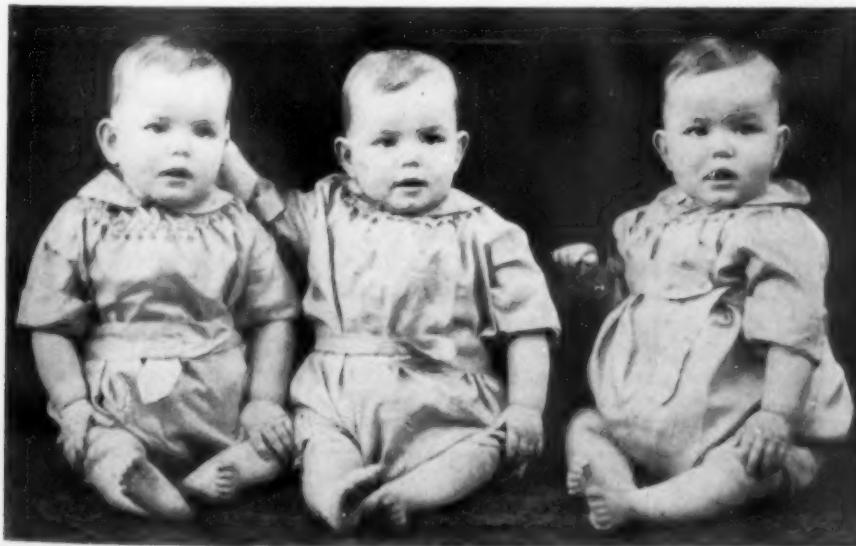
Triplets are usually of this non-identical type, because when a division occurs in the egg cell, the tendency is for it to form two parts, not three.

The identical triplets reported by Professors Clarke and Revell are all boys.

One set are the children of a family of German origin living in Stony Plain, Alberta. They look so much alike that their mother resorted to the scheme of having each wear a gold bracelet with his name engraved on it for identification. The hair of all three grows in an old clockwise whorl at the back of the neck although no other member of the family has this characteristic. The finger and palm prints of the triplets also follow a similar pattern which is like that of the father but unlike any others in the family. The boys received practically the same score on an intelligence test; they enjoy the same games and sports; and in school they all are good in arithmetic and poor in language.

The other set of triplets are still in infancy. They are now over two, but were only 17 months when they were examined. These boys look very much alike, although the parents are able to tell which is which without any great difficulty. The finger prints follow the same pattern which is different from their only sister.

Science News Letter, November 1, 1930



POSED AT SEVENTEEN MONTHS

*All left handed, all slow to walk, and all teathed at the same time*



TEN YEARS OLD

*Youngest of fourteen children*

ARCHAEOLOGY

### Totem Poles, Monuments To Illustrious Dead

**T**OTEM POLES were not the idols of American Indians, but were the monuments erected to their illustrious dead. The poles were erected by the families of the heroes commemorated, and remained the prized possessions of their descendants for generations.

These are some of the facts collected by Marius Barbeau, an ethnologist for the National Museum of Canada in four field seasons spent among the Indians and recently published by him.

Science News Letter, November 1, 1930

# How Diseases Have Ruled the World

By JANE STAFFORD

JOAN OF ARC never grew up. If she had her entire career would have been different. She would not have saved France. She would probably not have been burned at the stake. She would not have become a saint herself. This theory has been advanced in explanation of the Maid of Orleans by an Australian physician, Dr. C. MacLaurin, who has studied her life from a medical viewpoint.

The girl saint was never more than a child, Dr. MacLaurin concluded from his study of the records. Even at the time of her tragic death she was not really 19 or 20, but only about 12 or 13 in physical and mental development. It was her very immaturity that caused her to see visions, and to believe them so fervently that she was led to succor France and to martyr herself.

If she had matured as most girls do and her ductless glands had developed and functioned normally, she would probably have become a peasant's wife, mother of a family and would have died in her bed instead of perishing in the flames. She would never have gone to the aid of France and her weak vacillating dauphin, later King Charles VII.

Joan first heard her Voices—those saints' Voices which inspired and directed her whole short life—when she was about thirteen years old, just when she should have begun to mature. A little later she was informed by these Voices that she was to remain a virgin. This idea was probably growing in her mind from the time when she first realized that she was not to be like other women.

### Peculiarities of Body and Mind

The proof that Joan did not mature is found by Dr. MacLaurin in various contemporary accounts, particularly in the reports of the women who attended her and of her steward and loyal follower, Jean d'Aulon.

The peculiarities of her body were responsible for the peculiarities of her mind, Dr. MacLaurin explains. The psychic changes accompanying physical maturity lead normal people into love and marriage. They led Joan into furious religious zeal and extreme



THE FRENCH HEROINE

*Not as artist and legend portray her, but as scientific studies say she must have appeared*

Puritanism. Psychiatrists say that Puritanism, religious fervor and the militant spirit of reform which is its modern counterpart are often the expressions of repressed, unsatisfied instincts.

In Joan's day there were no psychiatrists to give a scientific explanation of her Voices and hallucinations. They were considered either divine or demoniac, miraculous or magical, according to whether you believed her the Maid of God or a witch. She believed in them devoutly, but at the very end common sense reasserted itself and she realized, too late, the truth, Dr. MacLaurin thinks.

Her very answers at her trial for her life are child-like and show only the simple cunning of a child, rather than the inspired cleverness which some have attributed to them, the Australian doctor says. She seems to him to have been a direct, simple, superstitious child. At the end, she was swayed by very human fear, though her physical and moral courage during the greater part of her life were remarkable.

Her Puritanism showed itself in various ways. She would not tolerate any women around the army camps. She

herself wore men's clothing in order to be less attractive to the soldiers. This gives us a clue as to how she looked. She must have had a boyish, undeveloped figure, otherwise the masculine attire would have had quite the opposite effect from the one she desired. A normal peasant girl of Joan's time would have only emphasized her sex by appearing in men's clothing.

### Hardening of the Arteries

Just as the physical abnormalities of this one girl changed the face of history, so physical abnormalities or disease in other men and women of the past have had their share in making the world's history, and still are affecting the destinies of nations and their peoples.

A very common condition which has played a big part in directing the world's affairs is hardening of the arteries, known medically as arteriosclerosis. Its frequent companions are high blood pressure, chronic Bright's disease and gout. This combination of diseases afflicted Charles V of Spain, Holy Roman Emperor, under whose reign Cortes made his famous conquests in America and Magellan voyaged round the world.

Charles V was a glamorous hero, and has been called the greatest figure in Europe between Charlemagne and Napoleon, but he ate himself to death. He was a brilliant military leader and a great statesman. At one time he held control over most of Europe and all of America then known to the white man. However, he took no care of himself, but "went roaring and fighting and guzzling and drinking all over Europe." The strain was more than his arteries could stand. At the age of 56 he was obliged to relinquish all his power and abdicate, much to the distress and misfortune of the world.

"When we consider that the destinies of nations are commonly held in the hands of elderly gentlemen whose blood pressures tend to be too high owing to their fierce political activities, it is not too much to say that arteriosclerosis is one of the greatest tragedies that afflicts the human race," Dr. MacLaurin declares.

The irascibility, unreasonable prejudices, and fits of depression which accompany high blood pressure, arteriosclerosis, gout or Bright's disease often make life miserable for the families and employees of the modern business man or politician who suffers from them. They made it even harder for the subjects of a medieval absolute monarch so afflicted.

Philip, Charles' son, who succeeded him, led a most abstemious life, but suffered from the sins of his father. Insurance companies know that children of men who have had either arteriosclerosis, chronic Bright's disease or gout are more likely to suffer from one of these diseases or a combination of them. Philip drank and ate moderately but he worked hard, driven by a relentless conscience, and he took no exercise. His care of himself enabled him to live 20 years longer than his brilliant father had, but he died of the same diseases complicated by diabetic gangrene, a frequent accompaniment of them.

Twenty years less of Philip, with his bitter religious persecutions, and twenty years more of his father might have made a vast difference to Europe. There would probably have been no Spanish Armada, no revolt of the Netherlands. Charles understood this latter country, but his son did not. An extra twinge of gout may have made Philip refuse the Dutch envoys' requests for more tolerant rule.

Another very common disease of modern times had just made its appearance in Europe during the romantic youth of Henry VIII, England's bluff King Hal of the many wives. This gay young Prince's adventures make entertaining reading, but they laid the seeds of disaster for himself, his family and many of his subjects. Syphilis probably attacked the king during his youth. If it did, it explains his subsequent conduct, including the numerous wives and the poor health and early deaths of all but one of his children.

#### Why Henry VIII's Wives

This ailment is more than a disease of skin and bone, and general paralysis or paresis is not its only nervous result. Among neurotic people it may cause serious mental trouble, although not affecting the actual brain tissue, so far as can be seen with the microscope. Phobias and obsessions, poor mental balance, and degeneracy result from syphilis. From all of these Henry VIII seems to have suffered. How else can one explain his brutal treatment of

wives and subjects, his many tyrannical acts, his changed appearance?

It was probably because of the very disease from which he suffered that Henry had so many wives. It is characteristic of that disease that its victims often have exaggerated sexual desires. This coupled with his wish to have a son and heir led him on from wife to wife. He might have had the son by the first wife if it had not been for his disease which he transmitted to her. While Mary Tudor was the only child

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## YOUR LIFE TODAY has been mapped by Maladies of Dead People

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**If Martin Luther had not suffered from ear disease, would there have been a Reformation?**

**If Joan of Arc's glands had developed like those of normal girls, would she have saved France?**

**If mighty Charles V had not lived at high tension like many modern business men, would Europe be divided into countries as that continent is today?**

---

of Henry and Catherine of Aragon who lived, they had a number of sons born dead or who died a few days after birth, all probably as a result of their father's disease.

Mary Tudor, his daughter, the Bloody Mary of history, probably suffered from inherited syphilis. The wizened, lined and prematurely aged face seen in her portrait is typically the face of a sufferer of delayed hereditary syphilis. She died suddenly, and if the inherited disease had affected her heart, this might explain the sudden death. However, she was a sickly child and never was well during her whole short life.

Elizabeth seems to have been the only healthy child of Henry VIII. Not only was she healthy enough to live to nearly 70 years of age, but she probably did not have the various physiological abnormalities that have been attributed to her. It is Dr. MacLaurin's opinion, after considering all these

stories from a strict medical viewpoint, that there is nothing to them. She was probably a fairly normal and healthy woman. A slight imbalance of her ductless glands would explain the masculine characteristics which have given rise to so much speculation.

The curse of the Tudors which so afflicted all England for nearly 100 years was probably the same disease that attacked Ivan the Terrible of Russia. In Ivan the disease went much further with much more disastrous results than in Henry VIII. Ivan started out as a brute and ended in being what we would today call criminally insane. There seems little doubt, judging from his acts and his letters, that Ivan's insanity was the result of syphilis.

#### Luther's Rare Disease

A quite different and much rarer disease was the famous devil of Martin Luther. This remarkable man, who had such an immense influence on the world's development, believed that he was actually haunted by the devil himself. He could hear the fiend roar and whistle in his ears. He felt him grip his heart. At times the devil made him so dizzy that he fell from his work stool, Luther said. On one occasion, Luther became so enraged he threw an inkwell at this tormenting fiend.

Actually the poor man undoubtedly suffered from Ménière's disease. This is a disease of the middle ear which occasionally attacks middle-aged and gouty people. The victim suffers from dreadful noises in the head and terrible giddiness. Luther also was afflicted with earaches, discharge from the ears and deafness, so there is little doubt that his head noises were due to ear disease and were not hallucinations.

Did Charles I of England lose his head because he was a stammerer? This is the interesting conclusion that may be drawn from studying his tragic life from a medical viewpoint.

The wistful expression seen in his portrait indicates that he never outgrew the baby fear and nervousness which probably made him a stammerer. At the very last, his youthful handicap may have prevented him from speech that would have saved his life. During his trial he is reported to have said brokenly, "They will not suffer me to speak." Dr. MacLaurin suggests that during that dreadful moment the old bad habit of his childish days returned so that he actually could not speak for the time.

## GEOPHYSICS

**River Sediment Caused New Orleans' Quake**

**S**EDIMENT from the Mississippi River, deposited around the delta in the Gulf of Mexico, is thought by Dr. William Bowie, of the U. S. Coast and Geodetic Survey, to have been responsible for the small earthquake felt in New Orleans on Sunday, October 19.

According to the theory of isostasy, developed by Dr. Bowie, the whole earth is in "isostatic" equilibrium. That is, the mountains are of lighter material than the lower regions, and together they all balance. As material shifts whether by deposit of sediment or by erosion, the equilibrium is restored by movement of the parts of the earth, and sometimes these movements produce earthquakes. Dr. Bowie pointed out that a number of small earthquakes is really an indication of safety, for otherwise the strains may be accumulating to such an extent that when they are released a world-shaking quake is the result.

Every year the Mississippi deposits millions of tons of sediment around the delta, and observations made by the Coast and Geodetic Survey, and also by Dr. A. Vening-Meinesz, a Dutch geophysicist, who a few years ago made some gravity measurements in the region in an American submarine, show that the Gulf is in equilibrium. Hence there must be occasional shifts to achieve this.

Dr. Bowie also suggested that the effect might be due to slumping. That is, when loose material is piled into a high mound, the slope finally becomes so great that the top parts slide off so that the pile attains an angle less steep. This may occur under water with the material around the delta.

*Science News Letter, November 1, 1930*

## SURGERY-ELECTRICITY

**Electric-Knife Wounds Weaker Than Scalpel Cuts**

**A**MATHEMATICAL study of the tensile strength of wounds, their ability to resist strain or rupture, was reported to the American College of Surgeons meeting in Philadelphia by Dr. John D. Ellis of Chicago. The study was part of a comparison of the healing of surgical and electro-surgical wounds.

Cuts were made with a knife or scalpel, and specimens of the wounds, a small fraction of an inch each, were pulled apart and their tensile strength

recorded in grams, or fractions of pounds.

Less than two-thirds, or 60 per cent. of the wounds made by electro-surgery healed by what surgeons call primary intention, as compared with 97½ per cent. of the wounds made by the scalpel. Furthermore, the electro-surgical wounds did not develop the tensile strength of the scalpel wounds for 21 days.

Electrosurgery has its greatest usefulness in the removal of malignant diseases or cancer, Dr. Oscar E. Nadeau of Chicago said at the same session. Because of the sparks from the electro-surgical needle or knife, ethylene gas or other explosive anesthetics cannot be used.

Successful use of this method in operations for goiter was reported by Dr. Martin B. Tinker of Ithaca, N. Y.

The application of electrosurgery to surgery of the brain and nervous system makes the third great advance that has been made in the field of neurosurgery, Dr. Ernest Sachs of St. Louis declared. By its means, brain tumors that were formerly considered inoperable can now be dealt with and other types of brain tumors can be removed more safely than before.

*Science News Letter, November 1, 1930*

## PUBLIC HEALTH

**How Not to Eat Too Much, Future Health Problem**

**O**BESITY, or overweight will be the nutrition problem of the future, taking the place of malnutrition and rickets, Dr. Alonzo Engellbert Taylor of Leland Stanford University predicted at the celebration of medical progress held at the University of Pennsylvania Medical School, Philadelphia.

Instead of worry over how to feed the world, man's worry will soon be how to keep the world from being overfed. Scientific methods of farming have increased the crop production, and at the same time the use of machinery on the farm has decreased the number of animals to be fed, which in turn increases the world's food surplus. Likewise, the world population will soon become stationary, so there will be fewer people to feed.

At present physicians are still teaching people to eat enough to avoid malnutrition and lowered resistance to disease. All that will change and the physicians will soon need to teach people not to eat too much.

*Science News Letter, November 1, 1930*

**IN SCIENCE**

## PUBLIC HEALTH

**Slight Paralysis Increase But No Danger of Epidemic**

**A** SLIGHT increase in cases of infantile paralysis has been reported to the U. S. Public Health Service. The total number of cases for the week reported was 568, with increases in Ohio, which had a total of 96; California, which had 87; Nebraska with 35 and Minnesota with 20. The present outbreak has not fallen off as sharply as had been expected, but public health officials now feel that there is no danger of a severe epidemic. A gradual decline in the number of cases is expected.

*Science News Letter, November 1, 1930*

## ARCHAEOLOGY

**30 Ancient Pueblo Villages Found in Arizona**

**T**HIRTY new Pueblo sites have been unearthed in southeastern Arizona by Prof. Carl O. Sauer, of the geography department of the University of California at Berkeley.

The villages were all situated on the gentle slopes at the base of the mountains where the summer floods could be best utilized for farming. There has clearly been very little change in climatic conditions during the intervening centuries, Professor Sauer reported.

The complete defenselessness of the location indicates that the Chiricahua Pueblos date back to a more peaceful period than do the walled towns of New Mexico. The houses were for the most part built with their floors two or three feet below the level of the ground, anticipating the pit houses of a later period.

A few of the Pueblo sites contain springs, but many are distant many miles from the nearest water. Professor Sauer concludes from this that the villagers may have spent the dry spring months in the mountains, returning to their towns with the summer rains.

The complete depopulation of these Chiricahua Pueblos appears to be due to the onslaught of savage tribes, rather than to famine.

*Science News Letter, November 1, 1930*

## SCIENCE FIELDS

## ORNITHOLOGY

**Drought May Be Cause of Fewer Flights of Bats**

THE BATS which live and hibernate in one end of Carlsbad Caverns, New Mexico, estimated at three million in numbers, have not been giving their usual spectacular flights recently.

Two reasons are advanced for this. One is that the extremely dry weather of the past season has caused a scarcity of night-flying insects. The other is that they have been disturbed by work going on in a nearby guano mine. Occasionally, however, they stream forth in great numbers, their flight from the cave opening lasting for several hours. An interesting feature of the bat exodus is that although they always fly south when they emerge from the cavern, they invariably return next morning from the north.

Soon now these little mammals will entirely cease their nocturnal flights and go into hibernation for the winter.

*Science News Letter, November 1, 1930*

## MICROSCOPY

**Single Cell Operation Shown in Movies**

MICRO - MOVING - PICTURES showing how single cells may be operated on under high magnifications have been given their first public presentation before the New York Electrical Society. Dr. H. J. Fry, professor of biology at New York University, explained the films which were made by Prof. Robert Chambers of Washington Square College, New York University.

Slivers of glass mounted on special handles are used in some of these operations which are made on subjects so small that they cannot be seen without great magnification. The micro-technic has opened up new fields for experiment in biology and medicine. By its means single cells can be isolated from their neighbors for the purpose of obtaining pure-line tissue cultures. Substances such as bacteria and fluids can be injected directly into the interior of

living cells while these are under observation. Every stage of their reaction may thus be studied.

Some of the problems already studied are the physical nature of cells of blood, nerves, muscles and skin; structure and function of the kidneys; the action of salts on physiological systems and of heavy metals on amebae and marine eggs by immersion and injection methods. The action of soaps, proteins, fats, glycerin, sugar and gases on amebae has also been studied.

*Science News Letter, November 1, 1930*

## ENGINEERING

**Admiral Taylor Chosen for Highest Award of Engineers**

See front cover

THE John Fitz Medal Board of Award has chosen Rear Admiral Watson Taylor, U. S. N., retired, for the highest award for professional distinction the engineering profession of America will confer during 1931.

In summing up Admiral Taylor's accomplishments the Board cites outstanding achievement in marine architecture, revolutionary results of persistent research in hull design, improvements in many types of war ships and distinguished services as Chief Constructor of the United States Navy during the World War.

The award is the combined choice of the four American societies of civil, mining and metallurgical, mechanical and electrical engineers. The award was first made in 1902 and since that time it has been given many of the world's most prominent engineers including Lord Kelvin, George Westinghouse, Alexander Graham Bell, Thomas A. Edison, Alfred Nobel, Elihu Thomson, George W. Goethals, Orville Wright, Guglielmo Marconi, Elmer A. Sperry and Herbert Hoover.

Both as midshipman at the U. S. Naval Academy and as a post graduate at the Royal Naval College, Greenwich, England, he made the highest marks ever attained at these institutions by any student up to that time. Prior to his entrance in the Naval Academy, Admiral Taylor attended Randolph-Macon College in Virginia, his native state. Stevens Institute of Technology, Hoboken; George Washington University, Washington; Glasgow University, Scotland; and Randolph-Macon College have honored him with doctorates.

*Science News Letter, November 1, 1930*

## HOME ECONOMICS

**Housewife Walks 700 Feet While Making Apron**

HERE IS a modern adaptation of the trail of thread that marked the hero's path through the labyrinth in the old Greek story. The modern thread trail was set to measure the steps taken by a housewife in the supposedly quiet task of making an apron. The housewife of the experiment went in and out of seven rooms and walked 700 feet, in assembling and putting away her equipment.

The experiment, conducted by Miss Ella Cushman at Cornell University, led up to the demonstration that all but 61 feet of walking distance could be eliminated, by establishing a "sewing center" in one room of the home. A special cabinet, with ironing board, full-length mirror, pockets, racks, drawers, a dressing form, and cutting table all combined, has been designed at the college.

*Science News Letter, November 1, 1930*

## PHYSICS-PUBLIC HEALTH

**Wide Band of Ultraviolet Helps Prevent Rickets**

A MUCH wider range of ultraviolet rays than that commonly thought effective helps in the prevention or treatment of rickets, Prof. John W. M. Bunker of the Massachusetts Institute of Technology and Robert S. Harris, research associate at the Institute, reported to the American Public Health Association at its meeting in Ft. Worth, Texas, this week. Their report was based on a two-year study of 800 animals.

The wave length range generally thought effective is between 3022 and 3026 Angstrom units. An Angstrom unit is about one two hundred and fifty millionth of an inch. When this range is extended to include ultraviolet rays of shorter wave lengths, greater protection against the disease is obtained.

Their work also showed that when the treatment combines ultraviolet rays and infrared rays, the curative or protective action of the ultraviolet rays is interfered with. If the infrared rays are given immediately after the ultraviolet rays, the interference is greater than when the infrared rays are given first. This part of the work corroborates earlier reports, they stated.

*Science News Letter, November 1, 1930*

ASTRONOMY-PHOTOGRAPHY

# Photography Of The Stars

## "A Classic of Science"

**THE TELESCOPE, the spectroscope and the camera are the three great keys to the mystery of the stars. Pickering combined the use of all three to make a new kind of chart on which the stars register their own position in the form of their spectra.**

*AN INVESTIGATION IN STELLAR PHOTOGRAPHY conducted at The Harvard College Observatory, by Edward C. Pickering. Cambridge (Mass.), 1886.*

### Charts

**I**N THE formation of charts of the stars by photography, we have a definite model to copy. It is not likely that any one will attempt to construct by eye observations charts of any considerable portion of the sky which will be more complete than those of Peters and Chacornac. If then charts equal to these can be obtained by photography, it may be regarded as an entirely satisfactory solution of the question. The area of these charts is  $5^{\circ}$  square, and their scale is 6 cm. to  $1^{\circ}$ , or three times the scale of the Durchmusterung. This scale corresponds to a focal length of 343.7 cm. or 135.3 inches. But it is impossible, without enlargement, to print the finest details visible on a good photograph, and, if printed, they could not be seen without a magnifying glass. The necessity of such a glass would greatly interfere with the general utility of star charts, especially when they are to be compared with the stars at night. Accordingly, the plan of enlarging the photographs does not seem objectionable, although some of the finer detail is lost. The scale of the photographs taken with the telescope is 2 cm. to  $1^{\circ}$ . If then they are enlarged three times, their scale will be the same as that of the charts named above. Lenses are made for ordinary photographic purposes which will include a field of view of  $60^{\circ}$ , or even  $90^{\circ}$ , without serious distortion. A photograph of the stars is, however, a far severer test. The distortion becomes

perceptible even at a few degrees from the centre. With a single achromatic lens, the distortion is perceptible within a single degree; but with the compound achromatic, such as that of the telescope just mentioned, a much larger angle may be covered satisfactorily. The distortion at the sides of the plates,  $5^{\circ}$  from the centre, is not very large; at the corners of a plate  $5^{\circ}$  square, about  $3^{\circ}.5$  from the centre, the errors are so small that they will not seriously affect the value of a map.

The advantages of this plan for constructing star charts are its economy and the rapidity with which the work can be performed. When several exposures are made on each plate, an error in one will ruin the whole. A single exposure of one hour is here proposed, which also diminishes the danger of interruption by clouds. The apparatus works automatically, and an observer is not needed who shall continually correct the motion of the clockwork by watching a star through an attached telescope. A great saving in fatigue is thus effected, and skilled labor is not required, since the work may easily be reduced to a routine.

The cost of continuing the work throughout the entire night would be small, since it would only be necessary for the observer to change the plate and readjust the instrument once an hour. If desired, the intervening time could be employed in other observations. The average length of a night, after allowing for twilight, is about ten hours. It would not be difficult to find a location where four nights in every week would be clear. This would give for the maximum capacity of a single photographic telescope nearly two thousand plates

annually. The area covered by each plate is twenty-five degrees square. The total area of the sky is about forty thousand degrees square. Sixteen hundred plates would therefore be required to map the entire sky. Two stations must be employed to reach both northern and southern stars, and it therefore follows that it would be possible to prepare in this way a map of the whole sky in a single year. The final charts would not show the faintest stars that could be obtained by photography with larger instruments, but would give about as many stars in a given area as are contained in the charts of Peters and Chacornac. The charts should be carefully compared with the original negatives, to remove defects which might be mistaken for stars. To avoid the need of this comparison, the polar axis of the instrument may be moved slightly in azimuth. Each star will then leave a short vertical trail. These can be distinguished with certainty from defects in the plate, and will give a more accurate indication of the brightness of the stars than can be derived from circular images.

### Stellar Spectra

An investigation of the photographic spectra of the stars was conducted on an entirely different method from that employed by previous investigators. A large prism was constructed, and placed in front of the object-glass, as was first suggested and tried by Father Secchi in his eye observations of stellar spectra.

The great advantages of this method are, first, that the loss of light is ex-

### Rayon,

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### CHARDONNET,

one of the earliest to experiment in this field, contributed

### Next Week's Classic, No. 139 to

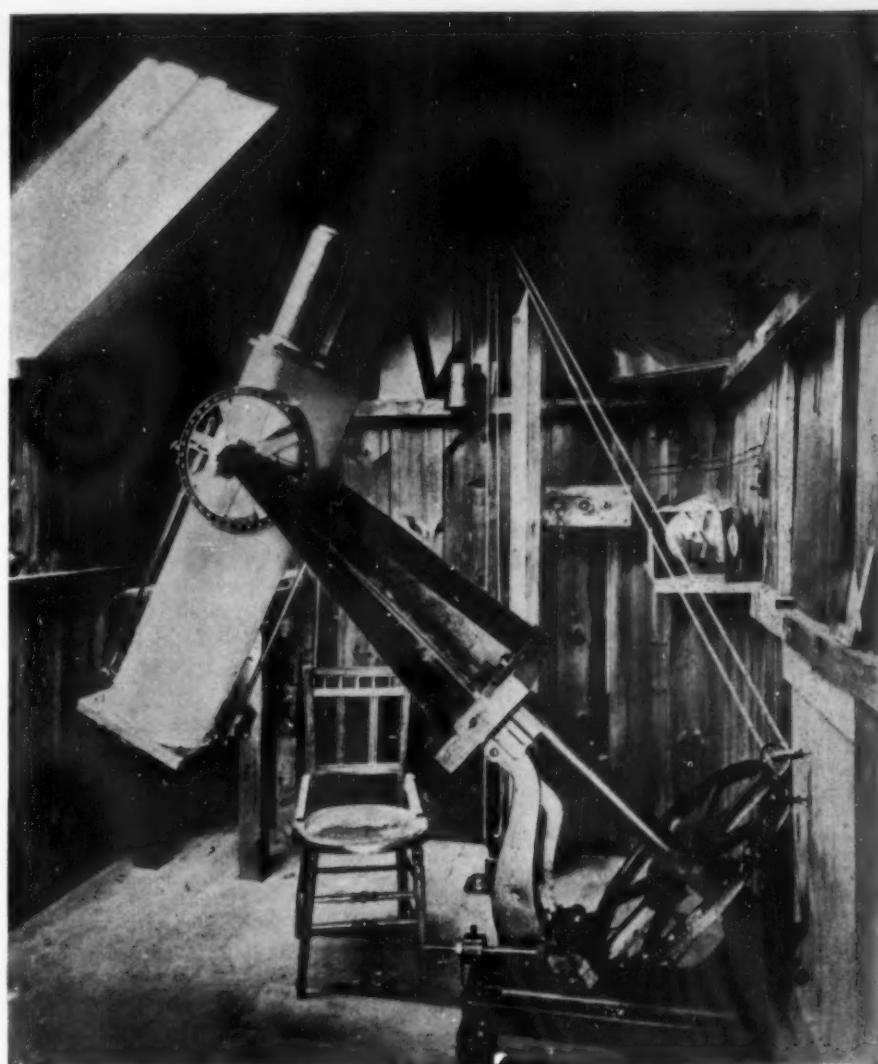
Comptes Rendus. It has been specially translated for the Science News Letter.

tremely small, and, secondly, that the stars over the entire field of the instrument will impress their spectra upon the plate. As a result, while previous observers have succeeded in photographing the spectrum of but one star at a time, and have not obtained satisfactory results from stars fainter than the second or third magnitude, we have often obtained more than a hundred spectra on a single plate, many of them relating to stars no brighter than the seventh or eighth magnitude.

The first experiments were made in May, 1885, placing a  $30^\circ$  prism in front of the object-glass of the lens. No clockwork was used, the spectra being formed of the trails of the stars. In the spectrum of the Pole-star over a dozen lines could be counted. In the spectrum of *alpha Lyrae* the characteristic lines were shown very clearly. Exposures of two or three minutes were usually employed, although one minute gave an abundant width. In the spectrum of *alpha Aquilae*, besides the lines seen in *alpha Lyrae*, some of the additional faint lines noticed by Dr. Draper were certainly seen.

In the autumn of 1885, two prisms were constructed, having clear apertures of 20 cm. and angles of about  $5^\circ$  and  $15^\circ$ . They could be placed over the object-glass of the photographic telescope without reducing the aperture. The second of these prisms was that actually employed in the experiments described below.

The prism was always placed with its edges horizontal when the telescope was in the meridian. The spectrum then extended north and south. If clock-work was attached, a line of light would be formed too narrow to show the lines of the spectrum satisfactorily. The usual method of removing this difficulty is the employment of a cylindrical lens to widen the spectrum; but if the clock-work is disconnected the motion of the star will produce the same effect. Unless the star is very bright, the motion will, however, be so great that the spectrum will be too faint. It is only necessary to vary the rate of the clock in order to give any desired width to the spectrum. A width of about one millimetre is needed to show the fainter lines. This distance would be traversed by an equatorial star in about twelve seconds. The longest time that it is ordinarily convenient to expose a plate is about an hour. If then the clock is made to gain



#### THE HOME-MADE OBSERVATORY

*Where the Harvard star catalog, in which the whole firmament is recorded, had its birth.*

or lose twelve seconds an hour, it will have the rate best suited for the spectra of the faintest stars. A mean-time clock loses about ten seconds an hour. It is only necessary to substitute a mean-time clock for the sidereal clock to produce the required rate. It was found more convenient, however, to have an auxiliary clock whose rate could be altered at will by inserting stops of various lengths under the bob of the pendulum. One of these made it gain twelve seconds in about five minutes, the other produced the same gain in an hour. The velocity of the image upon the plate when the clock is detached could thus be reduced thirty or three hundred and sixty times. This corresponds to a difference of 3.7 and 6.1 magnitudes respectively. Since the spectrum of a star of the second magnitude could be taken without clockwork, stars of the sixth

and eighth magnitudes respectively could be photographed equally well with the arrangement described above.

#### Photography at Harvard

The work in stellar photography done at the Harvard College Observatory may be summarized as follows. The first stellar photograph ever taken was obtained here in 1850. In 1857 the investigation was resumed, and the value of stellar photography as a means of determining the positions and brightness of the components of double stars was established. In 1882, the present research was undertaken with a lens having an aperture of only  $2\frac{1}{2}$  inches. It was shown that photography could be used as a means of forming charts of large portions of the sky, and of determining the light and color of stars in

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all portions of the heavens. Photographs of the trails of close polar stars no brighter than the eleventh magnitude were obtained without clockwork. Stellar spectra were obtained of the brighter stars without clockwork, in which all the principal lines were well shown. In 1885 the investigation was resumed with a telescope having an aperture of 8 inches. With this, 117 stars within one degree of the pole, one of them no brighter than the fourteenth magnitude, left trails. The average deviation of the measures of the brightness of these stars on different photographs was less than a tenth of a magnitude, a greater accordance than is given by any other photographic method. A similar result was obtained from the Pleiades, of which group over fifty left trails. Similar trails are now being obtained of the stars north of  $-30^{\circ}$  in all right ascensions. This work began in the autumn of 1885 at  $23^{\text{h}}$ , and has already been completed for more than half of the sky. By photographing on the same plate polar stars near their upper and lower culminations, material has been accumulated for determining the atmospheric absorption on each night of observation. A study has been made of the application of photography to the transit instrument. Measurements of the trails show that the position of a star may be determined from its trail with an average deviation of  $0^{\circ}.03$ ,

which is about one-half the corresponding deviation of eye observations.

Charts may be constructed  $5^{\circ}$  square, having the same scale and dimensions as those of Peters and Chacornac. A single exposure of one hour is required, and it is not necessary that the observer should remain with his eye at the telescope to correct the errors of the clock.

By placing a large prism in front of the object-glass, excellent stellar spectra have been obtained. An exposure of five minutes gives the spectra of all stars brighter than the sixth magnitude in a region  $10^{\circ}$  square. About half of the region north of  $-25^{\circ}$ , beginning at  $0^{\text{h}} 0^{\text{m}}$ , has been photographed in this way. With an exposure of an hour the spectra of stars no brighter than the ninth magnitude are shown. Over a hundred stars have thus been taken simultaneously on a plate by a single exposure. Means have been provided for carrying out this work on an extended scale, as a memorial to the late Dr. Henry Draper.

Miscellaneous observations have been secured of the Pleiades, of the Nebula in Orion, of Jupiter's satellites, and of various other objects; also of the new star in Orion and of its spectrum, and one plate showing that this star must have been much fainter on November 9, 1885, than when discovered, five weeks later.

Science News Letter, November 1, 1930

### PHOTOGRAPHY

## New Apparatus Makes Talkies With Amateur Size Film

**P**ORTABLE sound movie equipment, using the narrow 16 millimeter film now standard for amateur cameras and projectors, has been developed by the Westinghouse Electric and Manufacturing Company. The Society of Motion Picture Engineers, at its recent meeting in New York, heard an account of this equipment, for which C. R. Hanna, P. L. Irwin and E. W. Reynolds are responsible.

The only difference between the sound film and the ordinary kind of the same size is that in the former one row of sprocket holes is omitted to make room for the sound track, the record being made right on the film

as in most of the theater methods. Like the large film equipment, the light from a small lamp shines through this sound track, then it is analyzed by a photoelectric cell, and converted into electric impulses. These in turn operate the loud speaker.

The entire equipment can be carried in three cases, one for the projector, one for the amplifier and one for the loud speaker and screen. Together they weigh 120 pounds, so that talkies have not yet been simplified quite as much as the tiny home silent projectors. However, the new apparatus is seen as a step nearer successful home talkies.

Science News Letter, November 1, 1930

## ASTRONOMY

# November Skies Reveal Three Planets to Naked Eye

THREE naked eye planets adorn the November skies, but not one is well placed for observation all evening. They do not appear on the star maps of the month. Early in the evening Saturn is visible low in the west just after sunset. On November 1 it sets at 8:27 P. M., but by the end of the month it has moved much nearer the sun and sets at 6:46 P. M.

Later in the evening, about nine o'clock, Jupiter can be seen in the northeast, just above the horizon. Its great brilliance makes it easy to locate. About two hours later, when Jupiter has moved higher, Mars appears in almost the same place. Red in color, and exceeded in

brilliance only by Jupiter and the star Sirius, which rises late in the evening, Mars is also easy to locate.

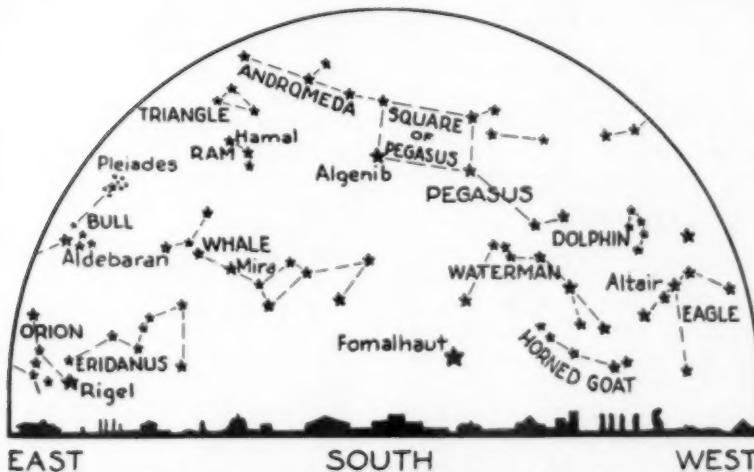
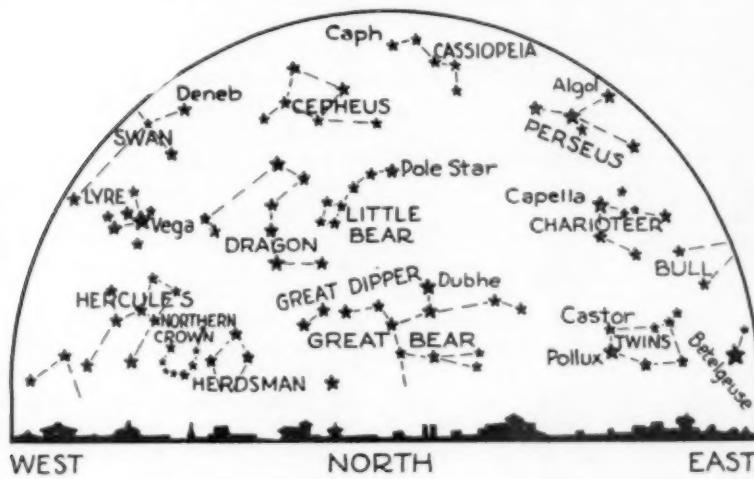
Eight first magnitude stars are now visible in the evening, and all are shown on the map. Vega, in Lyra, the lyre, is low in the northwest. Above it is the northern cross, now standing upright, with Deneb at its head. This group is properly known as Cygnus, the swan. Low in the southeast is the famous group of Orion, with the three stars that mark the warrior's belt vertical. To the east of the belt is the bright Betelgeuse, and to the south is Rigel. Above Orion is the bull, Taurus, which Orion is about to strike with his upraised club.

In Taurus, and of a brilliant red color, is Aldebaran. Fomalhaut, in Piscis Austrinus, the southern fish, is seen low in the south, a little to the west; and almost directly west is Altair, in Aquila, the eagle.

High in the northeast is Auriga, the charioteer, with the brilliant Capella. A familiar and conspicuous group that is now in the southern sky, though not made of first magnitude stars, is the great square of Pegasus. Pegasus, the winged horse, includes all the stars in the square except the northeastern one, which is in the neighboring group of Andromeda. To the north of these stars is the W of Cassiopeia, the lady in the chair. The great dipper, of Ursa Major, the great bear, is low in the north.

The event of greatest interest to star gazers during November is the Leonid shower of meteors which will occur on November 14 and 15. An article presenting the interesting facts about these meteors will be published in the SCIENCE NEWS LETTER for November 8, the issue which immediately precedes the shower.

Science News Letter, November 1, 1930



These maps make it easy to find stars in the heavens during November. Look to the north, say, and lay the map of the northern heavens in front of you. Then the constellations and stars will appear before you in the positions indicated on the map.

## SURGERY

## Attacks Medical Movies As Method of Teaching

AMERICAN surgeons were warned against the use of moving pictures for teaching medical students by Prof. George Grey Turner of Newcastle-on-Tyne, England, who delivered the John B. Murphy Memorial Oration at the annual meeting of the American College of Surgeons in Philadelphia recently.

"Clinical work cannot be learned by watching cinema demonstrations," he said. "The cinematograph is a dangerous method if it is offered in place of the more laborious plan where the learner comes into direct contact with the patient." He thought it had a very limited field of usefulness, and was chiefly valuable in post-graduate teaching.

"It is a means of bringing before the eyes of many what can be observed closely by only a few, but therein lies the danger," he said. He urged the medical profession of America, and particularly the College of Surgeons, to take a stand against attempts to arrive at medical education by easy routes, of which moving pictures are one.

Science News Letter, November 1, 1930

PUBLIC HEALTH

# Bubonic Plague Now in France Probably Came From Africa

THE CASES of bubonic plague in Marseilles, France, which have just been reported to the U.S. Public Health Service, may have had their origin in northern Africa where the disease has also been reported and where it is quite common, health authorities in Washington have said. So far only four cases have been reported from the French city, but there may be many more which have not yet come to the notice of officials.

The chief significance of the outbreak, so far as this country is concerned, is that Marseilles is now an in-

fested port and ships coming from there must be carefully watched by U.S. quarantine officers. Travellers to France, however, need feel no alarm, public health officials said.

Plague is a highly fatal disease. Known as the Black Death and the pest, this disease raged throughout Europe during the Middle Ages. Its first appearance seems to have been in Egypt in the time of the later Pharaohs. At present there are five spots at which it is always present and from which it is spread to various parts of the earth. Four of these are in Asia and one in Africa.

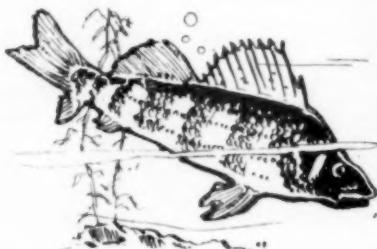
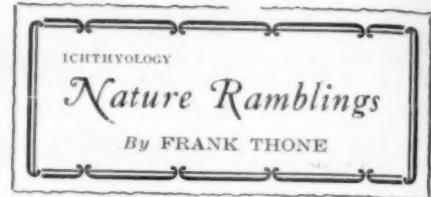
The disease is transmitted by the flea from rats, squirrels or other small rodents which harbor the germs. During an outbreak of it in this country, the ground squirrels became infected and have since been an additional reservoir of the disease. Eradication of rats by rat-proof construction of all buildings, including warehouses, business houses, residences and docks, is recommended as a means of protection against the plague. Rat guards are used on hawsers of ships coming from plague infested ports, and these ships are not allowed to come in contact with docks or other vessels.

The disease in man runs a very rapid course. Pneumonic plague, which is particularly fatal, attacks the lungs. Bubonic plague gets its name from the buboes or swellings of the lymph glands. A serum which gives fairly good results as a protective measure exists. Curative measures are not very successful. The mortality may be as high as 80 or 90 per cent.

Science News Letter, November 1, 1930

The housewife who wants to get setting-up exercises along with her sweeping will be glad to know that it takes two and one-half times as much energy to sweep a rug with a broom as it does to clean the same rug with a carpet sweeper.

The ancient Egyptians had a system of buying somewhat like our "dollar down and a dollar a month" plan, judging by Egyptian writings exhibited at the Field Museum.



**Yellow Perch**

"I PRAY you, sir, give me some observations and directions concerning the *Perch*, for they say he is both a very good and bold-biting fish, and I would fain learn to fish for him."

Thus the disciple of the Master of all Fishermen, the great Izaak. And the ways of the perch are well worth learning, though he be no bass or trout, for he puts up enough of a fight to give even an experienced fisherman a mild thrill, and when he comes to the table he can hold up his head and tail on the platter with the most aristocratic of them. Jordan and Evermann say of him, "As a pan-fish we do not know of any better among American freshwater fishes. We have experimented with the yellow perch and several other species, including both species of black bass, the blue-gill, wall-eyed pike, and rock-bass, eating each for several days in succession, and found the yellow perch the sweetest and most delicious of them all. One does not tire of it so soon as of the other kinds."

The yellow perch is for choice a lake fish, abounding in the smaller waters of the northern states; but it is found also in streams as far south as North Carolina. It bites readily the year round, on almost any kind of bait, and will on occasion even take an artificial lure. It can be fished for through the ice in winter, when it goes most readily after minnow bait.

The yellow perch never reaches really large size; a two-pounder is to be rated as pretty big, and most specimens do not run much over half that. But it is an economical fish, not wasting much weight on head and tail and other inedible parts, so that even perch of less than a pound are well worth taking home.

Science News Letter, November 1, 1930

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## BIOLOGY

## New Idea of Cause of Sex Revealed by Fruit Fly Studies

**A** NEW IDEA of the cause of sex is advanced and substantiated by experiments reported to the National Academy of Sciences by Dr. Calvin B. Bridges, of the Carnegie Institution of Washington, who has been working in the biological laboratories of the California Institute of Technology with Dr. T. H. Morgan, the pioneer investigator of the chromosomes, the minute rod-like cell particles that are the bearers of heredity.

Heretofore it has been believed that sex is determined by what are known as the "X" and "Y" chromosomes. When there are two "X" chromosomes the individual grows to be a female, when a "Y" joins with an "X," the result is a male.

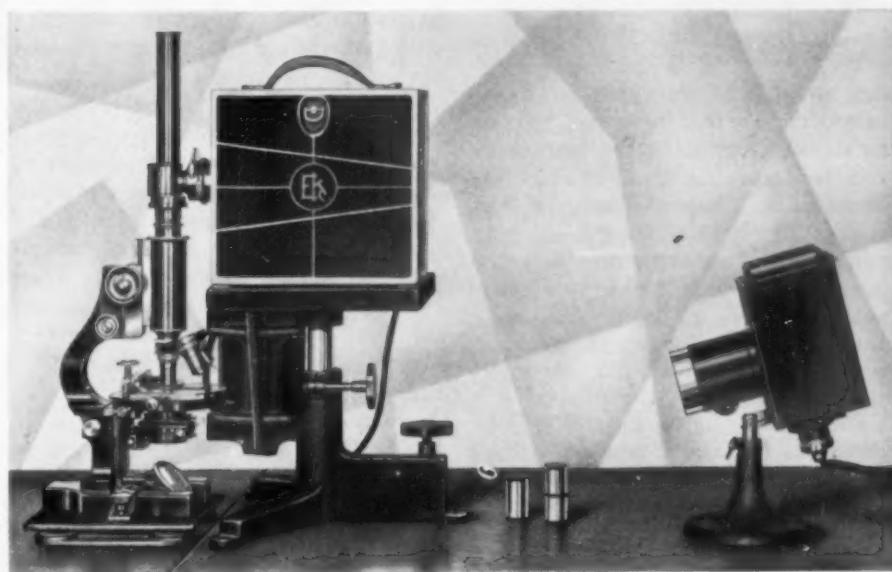
This is the case in many animals and insects, including man, in which 48 pairs of chromosomes are found in any rapidly developing cells of the living body.

Dr. Bridges now finds that sex does not reside in these two special chromosomes alone but in some cases is distributed in practically all the chromosomes. And he finds, as have other investigators who change roosters into hens, that sex is a matter of degree rather than an absolutely fixed state.

He finds that there are what may be termed superfemales, normal females, sex intermediates, normal males and supermales. This is determined by the ratio of the chromosomes present with the "X" rods carrying the female tendency and the ordinary and most plentiful chromosomes carrying the sections which bring masculinity. The sections of the chromosomes are called genes and for this reason the new theory is called the "genic balance."

The fruit fly, *drosophila*, which has furnished more information about heredity than any other kind of creature, was the subject of Dr. Bridges' experiments. He grew many thousands of these tiny banana flies in milk bottles and finally found the one fly that proved his theory. It was a short bristled creature that was peculiar because it contained only half the normal number of chromosomes and therefore only one "X" chromosome. According to his theory this haploid creature would be female; and this proved to be the case.

Science News Letter, November 1, 1930



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## Zoology

**WILD ANIMALS IN AND OUT OF THE ZOO**—William M. Mann—*Smithsonian Institution Series, Inc.*, 362 p. Fortunate is the city that has a zoo, and fortunate is the zoo that has as sympathetic and well-schooled a director as Dr. Mann of the National Zoological Park at Washington, D. C. In this, the latest volume in the Smithsonian Scientific Series, we learn of his many years of experience with all kinds of animals, from mouse opossums to elephants, both behind the bars and among the jungle trees. While the principal emphasis is naturally on the national zoo, there are fascinating accounts of how the problems of getting animals there are met and solved, and interesting excursions into the biography of famous individuals like Jumbo. And chapters like the one on "Some Rhinos the Park Has Not Had" show that there are still goals to be attained in stocking the National Zoo and that he has hope and ambition to attain them. The literary style is interesting and vivid, and the illustrations, both photographs and drawings, are up to the high standards of the series.

Science News Letter, November 1, 1930

## Linguistics

**MATTOLE, AN ATHABASKAN LANGUAGE**—Fang-Kuei Li—*University of Chicago Press*, 152 p., \$3. Analysis of a language spoken by California Indians who lived along the Mattole and Bear rivers. The study consists of phonology, morphological elements, lexical elements, and a text.

Science News Letter, November 1, 1930

## Zoology

**STUDIES ON THE STRUCTURE AND DEVELOPMENT OF VERTEBRATES**—Edwin S. Goodrich—*MacMillan*, 837 p., \$10. A scholarly discussion of the subject, not meant for general readers or any but advanced students and those engaged in teaching and research to whom it should be a welcome aid. There are numerous illustrations, many of which were drawn by the author. There is also a bibliography.

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## Astronomy

**DETERMINATION OF ORBITS OF COMETS AND ASTEROIDS**—Russell Tracy Crawford—*McGraw-Hill*, 233 p., \$4. One of the most practical problems that

the astronomer encounters is when a new comet or planet is discovered and he has to work out its exact orbit from a few observations. Undoubtedly the leading American center of orbit computation is the Student's Observatory of the University of California, and Prof. Crawford is one of their experts. In this excellent book he has produced the first text-book on the subject, for the larger works, such as Oppolzer, are much too inclusive for an introductory college course, though they have been used because no better work was available. Dr. Crawford provides an introductory text, and at the same time gives the very latest methods, such as those of Dr. Leuschner, his chief, and Dr. Merton, in England. Prerequisite to its use is a working knowledge of differential and integral calculus and spherical trigonometry. With this book now available, it is to be hoped that interest in the study of this important branch of astronomy will increase.

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## Archaeology

**THE MOUND-BUILDERS**—Henry Clyde Shetrone—*Appleton*, 508 p., \$7.50. Dr. Shetrone, who is one of the foremost authorities on the mound-builder Indian cultures, has made his book as simple and straightforward as the title. He has dedicated it to the average man and woman, who are aware of the human interest in the story of these prehistoric Indians and would like to know the important facts about them. The professional prehistorian will also find the book useful. It is the first book of its kind bringing the subject up-to-date in one compact volume. Besides general chapters on the manners and customs of these Indians there are a number of chapters on mound-building tribes of different localities, such as the Ohio area, the Great Lakes area, the Pennsylvania area. To make sure that the subject is clear to his readers Dr. Shetrone has chosen 299 illustrations, and they are both interesting and instructive.

Science News Letter, November 1, 1930

## Chemistry

**RESTORATION OF ANCIENT BRONZES AND CURE OF MALIGNANT PATINA**—Henry W. Nichols—*Field Museum*, 51 p., 50c. Describes the electrochemical process which was first developed by

Prof. Colin Fink, for the Metropolitan Museum of Art, and which has been used at the Field Museum for five years. Diagrams and descriptions of apparatus used at the Field Museum, and directions for procedures and results are explained.

Science News Letter, November 1, 1930

## Dietetics

**GROW THIN ON GOOD FOOD**—Luella E. Axtell—*Funk and Wagnalls*, 336 p., \$2. A cheery book full of good, safe advice, tempting menus and original recipes by a physician who reduced her own weight 75 pounds and passes on the method to others. The book emphasizes the importance of will power in reducing. Simple but effective exercises are given with advice on mechanical aids to reduction.

Science News Letter, November 1, 1930

## Mechanics

**MECHANICS FOR STUDENTS OF PHYSICS AND ENGINEERING**—Henry Crew and Keith Kuenzi Smith—*Macmillan*, 371 p., \$4. So often do modern writers neglect the historical side of their subjects that it is a relief to encounter a book such as this, in which the historical approach is used to show what mechanics is to day. Probably no physicist is better fitted for such work than Prof. Crew, who is already known as one of the co-translators of Galileo's "Dialogue Concerning Two New Sciences," which laid the foundations of modern mechanics. Here, in collaboration with his former colleague at Northwestern University, he has produced a college text on mechanics that is adapted to a year course meeting two or three times a week, or a semester course meeting five times a week. As an example of its practicability as a text may be mentioned the fact that the authors, feeling that mechanics should be started early and at the same time the student begins calculus, postponed use of this method to the middle of the work.

Science News Letter, November 1, 1930

## Aviation

**AVIATION ENGINES**—Ray F. Kuns—*American Technical Society*, 198 p., \$2. A handbook of aviation power plant operation and maintenance which has been written with the cooperation of manufacturers of the various engines.

Science News Letter, November 1, 1930